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10/802,312

03/17/2004

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03/23/2005

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EXAMINER

FENTY, JESSE A

ART UNIT

PAPER NUMBER

2815

DATE MAILED: 03/23/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/802,312

Applicant(s)

CHEN, YI CHOU



Examiner

Jesse A. Fenty

Art Unit

2815

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 25 February 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-25 is/are pending in the application.
- 4a) Of the above claim(s) 1-14 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 15-18 and 22-25 is/are rejected.
- 7) ☒ Claim(s) 19-21 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 06/23/04.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of Group II, claims 15-25 in the reply filed on 02/25/05 is acknowledged.
2. Claims 1-14 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 02/25/05.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 15-18, 22 and 23 are rejected under 35 U.S.C. 102(e) as being anticipated by Dennison (US 2004/0113136 A1).

In re claim 15, Dennison (esp. Fig. 9) discloses a semiconductor device, comprising:

a conducting element (180) at least partially disposed within a substrate¹ (140);

¹ Note that a "substrate" does not have to be the bottommost layer of a device. A "substrate" can be any underlying layer such that there are layers above.

a bottom electrode (220) at least partially disposed on a surface of the substrate and operative coupled (via layer 300) with the conducting element; and

phase change material (300) at least partially disposed on the surface of the substrate and operatively coupled with the bottom electrode.

In re claim 16, Dennison discloses the device of claim 15, wherein:

the bottom electrode has dimensions of length, height, and width;

the bottom electrode has its length substantially parallel to the substrate;

the bottom electrode includes a plane end surface formed substantially at a right angle to the length; and

the plane end surface forms an operative contact with the phase change material.

In re claim 17, Dennison discloses the device of claim 15, further comprising a pad layer (210) disposed on the surface of the substrate wherein the bottom electrode is formed on a sidewall of the pad layer.

In re claim 18, Dennison discloses the device of claim 17, wherein:

the pad layer comprises a top surface, a bottom surface, and at least two sidewalls (on either side of the conductor 180) disposed between the top and bottom surfaces; and

the bottom electrode is formed on one of the at least two sidewalls.

In re claim 22, Dennison discloses the device of claim 15, further comprising a top electrode (310; section [0053]) disposed on the phase change material.

In re claim 23, Dennison discloses the device of claim 15, wherein the phase change material comprises chalcogenide material (section [0052]).

5. Claims 15-18 and 23 are rejected under 35 U.S.C. 102(e) as being anticipated by Lung (US 20040248339 A1).

In re claim 15, Lung (esp. Fig. 9) discloses a semiconductor device, comprising:
a conducting element (500) at least partially disposed within a substrate² (400);
a bottom electrode (700) at least partially disposed on a surface of the substrate and
operative coupled with the conducting element; and
phase change material (900) at least partially disposed on the surface of the substrate and
operatively coupled with the bottom electrode.

In re claim 16, Lung discloses the device of claim 15, wherein:
the bottom electrode has dimensions of length, height, and width;
the bottom electrode has its length substantially parallel to the substrate;
the bottom electrode includes a plane end surface formed substantially at a right angle to
the length; and
the plane end surface forms an operative contact with the phase change material.

In re claim 17, Lung discloses the device of claim 15, further comprising a pad layer
(600) disposed on the surface of the substrate wherein the bottom electrode is formed on a
sidewall of the pad layer.

In re claim 18, Lung discloses the device of claim 17, wherein:
the pad layer comprises a top surface, a bottom surface, and at least two sidewalls (on
either side of the conductor 700 and phase change material 900) disposed between the top and
bottom surfaces; and

the bottom electrode is formed on one of the at least two sidewalls.

In re claim 23, Lung discloses the device of claim 15, wherein the phase change material comprises chalcogenide material (section [0048]).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 24 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dennison (as above) in view of Moore et al. (U.S. Patent No. 6,815,818 B2).

In re claim 24, Dennison (esp. Fig. 9) discloses an array of memory cells formed at least partially within a substrate (140), the array being organized into rows and columns (section [0054]), with the conductive material (320) connected to the bitline (source) and the phase change material (300) connected to the wordline, each memory cell comprising:

a conducting element (180) at least partially disposed within the substrate, the conducting element being operatively coupled with a source of a corresponding structure;

a pad layer (210) disposed on the substrate;

a bottom electrode (220) formed on a sidewall of the pad layer, the bottom electrode being operatively coupled with the conducting element;

² Note that a "substrate" does not have to be the bottommost layer of a device. A "substrate" can be any underlying layer such that there are layers above.

phase change material (300) at least partially disposed on the substrate and operatively coupled with the bottom electrode; and

a top electrode (310/320) formed of conducting material disposed on the phase change material and establishing operative contact with the phase change material.

Dennison does not expressly disclose the layout showing the gates of transistors in column and row configuration. Moore (esp. Fig. 4) discloses a similar chalcogenide memory device similar to that of Dennison showing the gate contacts (406) operatively connected with a common word line and source/drain regions (410) operatively connected with a common bit line. It would have been obvious for one skilled in the art at the time of the invention to connect the memory cells of Dennison in the arrangement disclosed by Moore for the purpose, for example, of maximizing space on the semiconductor wafer.

In re claim 25, Dennison in view of Moore discloses the device of claim 24, wherein the phase change material comprises chalcogenide material.

Allowable Subject Matter

8. Claims 19-21 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

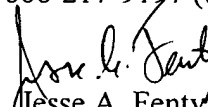
9. The following is a statement of reasons for the indication of allowable subject matter: The memory cell further comprising a second conducting element coupled to a second bottom electrode, wherein the phase change material is operatively coupled with the second bottom electrode is neither anticipated nor obvious over the prior art of record.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jesse A. Fenty whose telephone number is 571-272-1729. The examiner can normally be reached on 5/4-9 1st Fri. Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on 571-272-1664. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Jesse A. Fenty
Examiner
Art Unit 2815